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# **i-SAFE** implementing Social Awareness For Epidemic management

Solutions against pandemic  
November 6, 2020

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# Outline

- i-SAFE project: social distancing
- Inertial sensors for tele-monitoring of the breathing

Social distancing is a decisive countermeasure to slower and block the spread of pathogens in pandemic and epidemic contexts though it is difficult to achieve effectively.

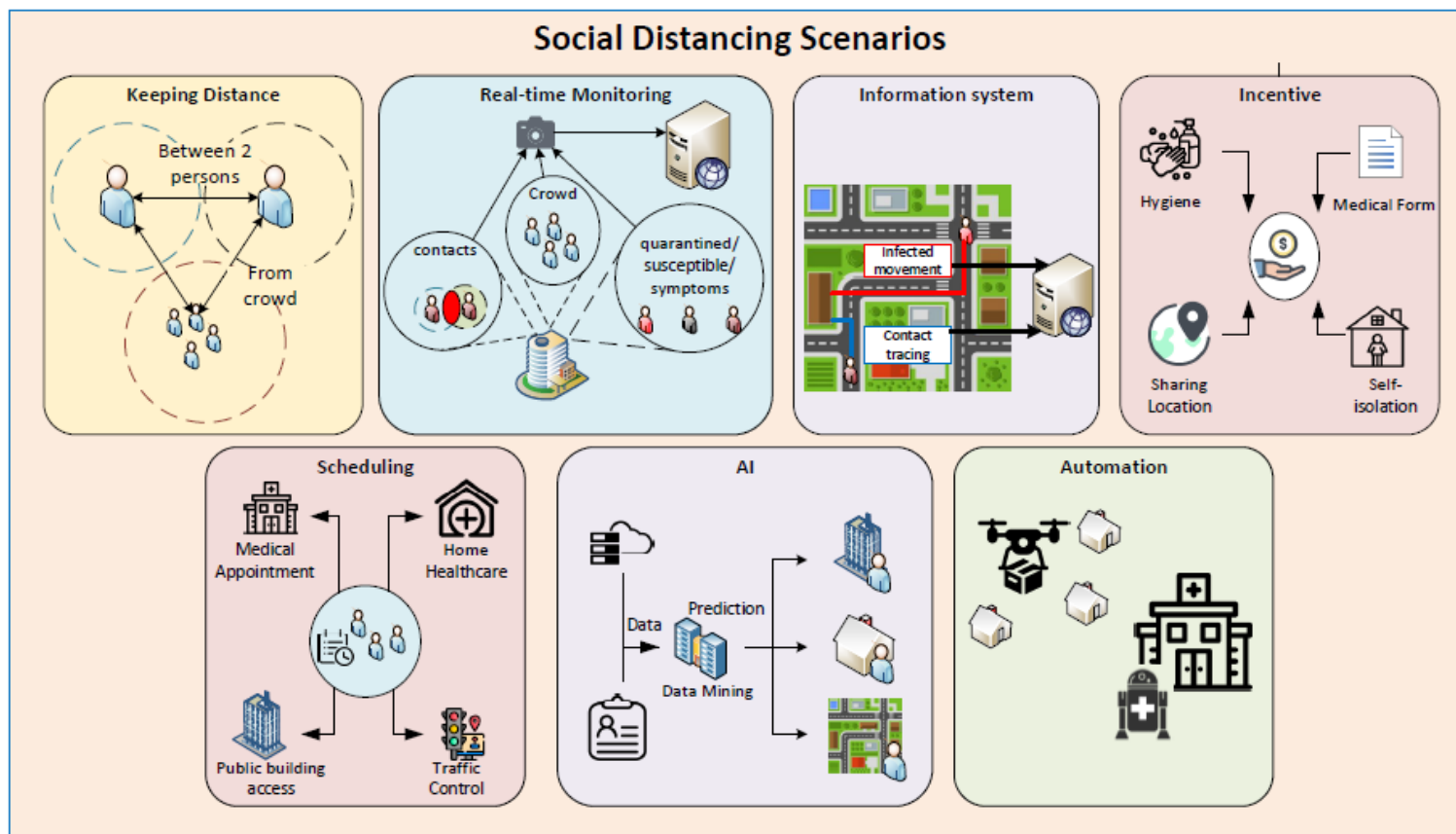


Figura tratta da:

C. T. Nguyen et al., "A Comprehensive Survey of Enabling and Emerging Technologies for Social Distancing—Part I: Fundamentals and Enabling Technologies," in IEEE Access, vol. 8, pp. 153479-153507, 2020, doi: 10.1109/ACCESS.2020.3018140.

The enormous variety of possible spatial configurations in real contexts (home, office, public area, sports context, outdoor space, etc.) is one of the challenges to be faced in order to achieve an effective social distancing.

Our aim is to obtain a technological assessment and an evaluation of the performance of social distancing systems based on the use of current mobile devices and / or of Real Time Locating Systems (RTLS), in order to prevent the transmission of infections and pandemics such as COVID-19. RTLS systems will be used to collect data in real time and monitor displacements with high accuracy.

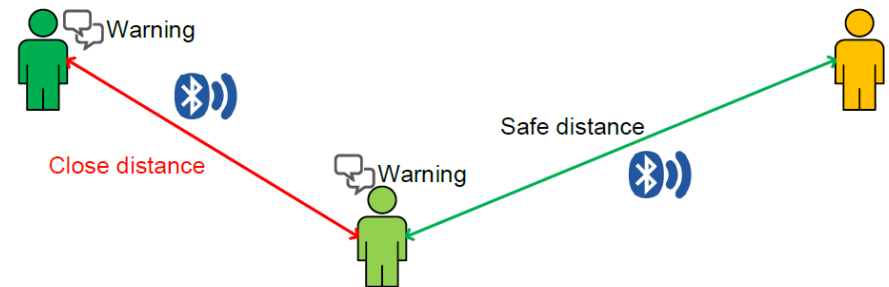
In particular, the main objective of the project is to define efficient evaluation rules and performance measurement procedures for wireless chipsets already present in smartphones, namely Wi-Fi, Bluetooth and GNSS and for devices that could be adopted in the near future, such as those based on ultra-wideband (UWB) signals in order to obtain the best performance in terms of correct and effective social distancing.

Stand-alone solution (for privacy adherence) + Network solution (for contacts certification) will be both analyzed.

A performance comparison between the BLE systems which has been adopted in the Italian anti covid app Immuni and an UWB systems which resorts to the deployment of UWB anchors will be envisaged.



✓ **UWB anchors**  
(Dedicated Infrastructure)



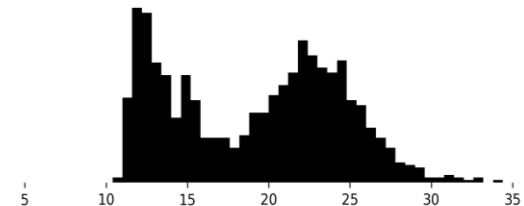
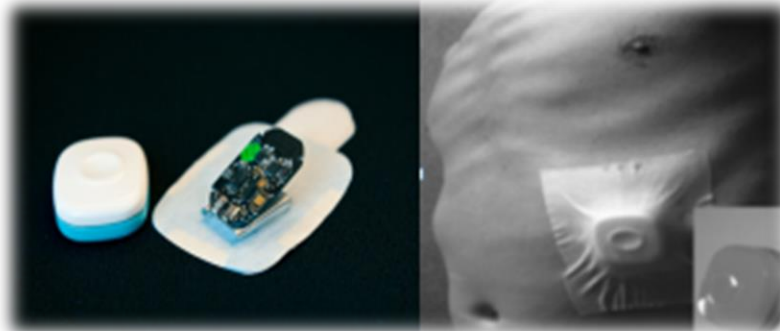
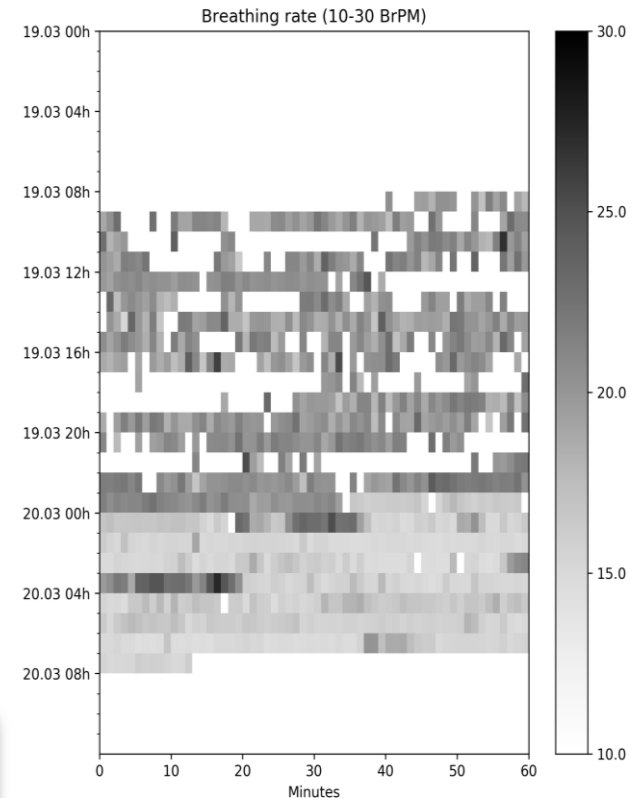
✓ **BLE devices**  
(smart-phones / wearables)

In detail, the proposal activities are divided into the following work packages:

1. Project administration and dissemination of results
2. Device requirements and preliminary tests
  - Definition of the requirements for social distancing services
  - Evaluation and assessment of technologies for distance measurement
  - Definition and set up of experimental tests, definition of KPIs
3. Experimental Campaigns
  - Design of the Geomatic System for the validation of the measurements
  - Experimental Campaign - Indoor and Outdoor Scenario
4. Reliability analysis and performance optimization
  - Analysis of failures and risks based on the experimental campaign
  - Data analysis (KPI)
  - Optimization strategies

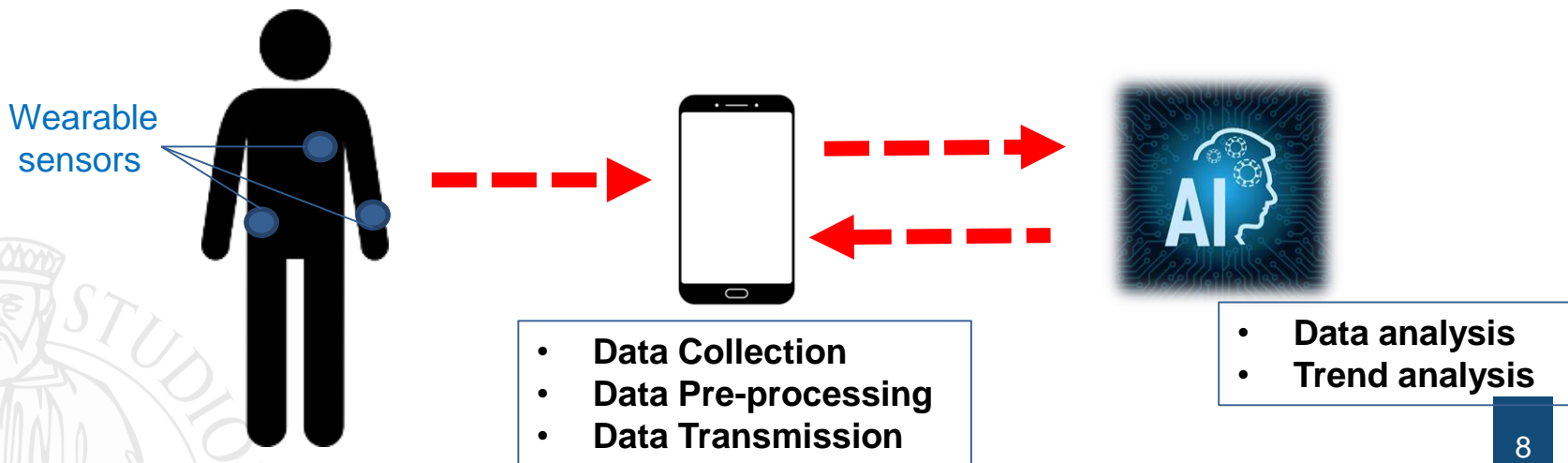
## Inertial wearable sensor for 24h remote monitoring of respiration (breath rate, coughing rate, etc.)

- Measure the respiratory rate and other parameters (coughing, etc.)
- It can be correlated to physical activity
- Sensor data transferred automatically to the server via the mobile phone
- Ease of use compared to SatO2 measurement devices



## Main goals: measure the quality of breathing

- Detect **activities** such as walking, sitting down, standing, lying down, sleeping, running, etc.
- Detect **coughing** episodes
- Detect **anomalous breathing patterns** such as breathing difficulties, obstructive breathing, apnea, etc.  
→ COVID-19







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